

# Improving Gene Functional Analysis in Ethylene-induced Leaf Abscission using GO and ProteInOn

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## Supplementary Data 1

**Table 1.** List of genes differentially expressed in LAZ, in the first moment (6h to 12 h after ethylene treatment, from Augusti *et al.* 2008).

Gene accession number	Putative gene identification over-represented in LAZ, 6h to 12 h after ethylene treatment	UniProt ac. number	UniProt ac. number <i>Ath</i> orthologue
CAN77838	Hypothetical protein (ABC transporter)	A5ADU1	
CAO62888	Unnamed protein (lipid transfer related domain)		Q8L6Y9
ABH02845	MYB transcription factor MYB93	Q0PJJ8	
CAO48860	Unnamed protein product (protein kinase)		Q9XIR9
AAX20031	RING-finger protein	Q08ET6	
AAO72741	Allene oxide synthase	Q84V85	
ABO83264	SAM dependent carboxyl methyltransferase		Q9AR07
NP_175577	ATMKK4 (Mitogen-activated Protein Kinase Kinase 4)	O80397	
AAB65155	Acidic cellulase	O22297	
NP_187533	LAC7 (laccase 7)	Q9SR40	

**Table 2.** List of genes differentially expressed in LAZ, in the second moment (6h to 12 h after ethylene treatment, from Augusti *et al.* 2008).

Gene accession number	Putative gene identification over-represented in LAZ, 24h to 36h after ethylene treatment	UniProt ac. number	UniProt ac. number <i>Ath</i> orthologue
ABP03135	Ribosomal protein L4/L1e		Q9SF40
BAB92932	40s Ribosomal protein S23	Q8L4F2	
ABK42077	Ubiquitin extension protein	A0MKC8	
AAX20031	RING-finger protein	Q08ET6	
CAN73548	Hypothetical protein (auxin-independent growth promoter)	A5AMI0	
ABN08074	Gibberellin regulated protein	A2Q374	
AAX84670	Ethylene response factor	Q52QY1	
ABD32293	TGF-beta receptor, type I/II extracellular region	Q2HU48	
AAR06252	Stigma/style ABC transporter	Q69FB5	
AAW47739	$\beta$ -galactosidase	Q5I190	
NP_194081	Glycoside hydrolases/ polygalacturonase (pectinase) family protein	O81746	
NP_188308	Glycoside hydrolases/polygalacturonase (pectinase) family protein	Q94C86	
AAB65155	Acidic cellulase	Q52QY1	
CAA65634	PS60 (pectina-metilesterase)	Q2HU48	
ABM91064	Xyloglucan-endotransglycosylases	Q69FB5	
ABB72441	Xyloglucan-endotransglycosylases	Q5I190	
BAF43573	Pectate lyase	O81746	
AAT44738	UDP-glucose:protein transglucosylase-like protein SIUPTG1	Q94C86	
AAB58398	UDP-glucose dehydrogenase	Q96558	
AAX37335	UDP-glucuronic acid decarboxylase 2	Q1M0P1	
AAM21292	lipid-transfer protein	Q8L5S8	
CAH03799	lipid-transfer protein	Q6EV47	
AAK52084	peroxidase	Q94IQ1	

**Table 3.** List of genes differentially expressed in Pet, in the second moment (6h to 12 h after ethylene treatment, from Augusti *et al.* 2008).

Gene accession number	Putative gene identification over-represented in Pet, 24h to 36h after ethylene treatment	UniProt ac. number	UniProt ac. number <i>Ath</i> orthologue
CAB87802	Chloroplast ribosomal L1-like protein	Q9LY66	
1909359A	Ribosomal protein S19		Q9SS17
Q9SMY8	F-box/LRR-repeat protein 15	Q9SMY8	
CAN79327	Hypotetical protein (small ubiquitin-like modifier)	A5BU70	
NP_200292	TSB1 (tryptophan synthase b-subunit)	P14671	
ABL67651	Putative auxin-repressed/dormancy-associated protein	A1ECJ8	
AAP06759	Auxin response factor-like protein	Q84QI6	
BAB12442	Gibberellin 2-oxidase 1	Q9FXV7	
AF170798	S-adenosyl-L-methionine synthetase	Q9SBQ7	
CAB60831	ACC synthase	Q9SMH1	
AAT09979	Hexose transporter	Q3L7K6	
CAN65381	Hypothetical protein (triose phosphate/phosphate translocator)	A5B912	
NP_175969	ATCAX5 (calcium exchanger 5)	Q8L783	
AAO39008	Plasma intrinsic protein 2,2	Q84XC6	
CAN62145	Hypothetical protein (NAC domain protein)	A5C6R7	
ABD32395	Histone-fold/TFIID-TAF/NF-Y	Q2HTM1	
ABD32408	Cellulose synthase	Q2HT16	
NP_187533	LAC7 (laccase 7)	Q9SR40	
CAN61862	hypothetical protein ( $\beta$ -1,3-glucanase)	A5BW82	
ABK06393	stress-related protein	A0FIJ6	
BAC20285	acidic class II chitinase	Q8H985	
CAA93847	chitinase	Q43752	
BAC20284	acidic class I chitinase	Q8H986	
AAC35981	chitinase CHI1	O82547	
AAG16758	glutathione S-transferase T3	Q9FT21	
AAG34804	glutathione S-transferase GST 14	Q9FQE4	
ABK95753	unknown (peroxidase)	A9PHA0	
ABG49115	peroxidase	Q0ZA67	
ABX79340	cytosolic ascorbate peroxidase	A9UFX7	
CAD42909	catalase	Q7XTK8	
ABB72806	alcohol dehydrogenase class III-like protein/glutathione-dependent formaldehyde dehydrogenase	Q2XPW7	

## Supplementary Data 2



**Fig. 1.** Ten most meaningful GO terms and corresponding information content (IC), of *biological process* type, annotated to gene products over-represented in LAZ : A - in the first moment; B - in the second moment, after ethylene treatment (Source: ProteInOn).

### Supplementary Data 3

**Table 1.** Isolated gene products associated to relevant processes, corresponding term annotations, term representativity (e-value) and information content (IC).

	Term name	e-value	IC	Gene products
LAZ/ first moment	protein phosphorylation	1.8e-02	0.244	O80397,Q8L6Y9
	response to stress	7.9e-02	0.193	O80397,Q9AR07
	response to oxidative stress	9.6e-05	0.379	P14671,Q7XTK8
Pet/ second moment	response to abiotic stimulus	1.4e-04	0.368	P14671,P55852
	regulation of biological quality	6.2e-03	0.245	P14671,Q9SMY8
	cellular catabolic process	6.3e-03	0.245	Q7XTK8,Q9SR40
	cellular aromatic compound metabolic proc.	7.7e-03	0.238	P14671,Q9SR40
	biological regulation	4.5e-02	0.121	P14671,P55852,Q9SMY8
	oxidation-reduction process	2.8e-01	0.112	Q7XTK8,Q9SR40

## Supplementary Data 4

**Table 1.** Functional characterization of isolated gene products over-represented in Pet, in the second moment (24h and 36h after treatment), after ethylene treatment.

Organ/ moment	Term Name	P	P	Q	Q	Q	Q
		1	5	9	7	9	8
		4	5	S	X	S	L
		6	8	M	T	R	7
		7	5	Y	K	4	8
		1	2	8	8	0	3
Pet/ second moment	indoleacetic acid biosynthetic process	√					
	auxin homeostasis			√			
	heat acclimation		√				
	response to oxidative stress	√			√		
	response to abiotic stimulus	√	√				
	protein sumoylation		√				
	lignin catabolic process					√	
	negative regulation of transcription factor		√				
	organ formation			√			
	response to stress	√	√		√		
	transmembrane transport						√
	response to salt stress	√					
	regulation of biological quality	√		√			
	cellular catabolic process				√	√	
	hydrogen peroxide catabolic process				√		
	cellular aromatic compound metabolic	√				√	
	calcium ion transport						√
	tryptophan biosynthetic process	√					
	biological regulation	√	√	√			
	oxidation-reduction process				√	√	